STRATEGIES FOR A SUSTAINABLE DEVELOPMENT OF URBAN TRANSPORT IN GERMANY

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The development of transport demand in Germany during the last decades is characterized by the unstoppable increase of motorized private transport. Both in passenger transport and in freight transport, the total mileage of the public transport services remained approximately on the same level, whereas the total transport increase was added to the traffic by motor cars and lorries.

So, for instance, the total passenger mileage by car increased to 450 percent during the last 40 years, whereas it rose by only 45 percent in public transport (Figure 1). Also, the ton mileage of road freight transport doubled during the last two decades, whereas the ton mileage of railway freight remained almost on the same level (Figures 2). In Germany in the year 1999, people travelled about 780 billion kilometres by car and 173 billion kilometres using public transport. Every year an average of 12 billion additional passenger kilometres are covered by car, and about 10 ton kilometres are additionally transported by lorry compared with the year before.

Although at the beginning of the 70s, the growth limits of individual motorized traffic became evident even for the general public, although since that time over and over again a reversal in transport policy has been demanded by scientists and announced by responsible politicians, although some policies supporting non-motorized and public transport have been launched, the tendency in transport demand has remained essentially the same up to the present day.

What are the reasons for this almost unstoppable development? Usually the enormous increase of motorization from 11 million cars in 1960 to more than 40 million cars today is identified as the main reason for the traffic flood. But that is true only on the face of it. The true reasons are deeply rooted in the efforts of each individual to reach a high standard of living. The main components are the following:

- Migration to city outskirts: The fact that many families move from the cities to the environs is followed by a corresponding increase in the length of journeys travelled to work or school. As the public transport situation is worse in the environs, people use more private cars than public or other transport modes than before. Figure 3 shows the increase in the number of commuters between communities within 30 years and particularly the increase of car commuters, which has gone up to more than 400 percent.
- Leisure time orientation: More leisure time and more leisure activities have created an increase in leisure traffic by car even on weekdays to more than 500 percent during the last 20 years (Figure 4). During weekdays we, therefore, have most traffic in the afternoon from 3 to 7 p.m. The typical change of weekday traffic within 20 years is shown in Figure 5.
- Specialization in industry: Growing consumer needs and intensifying specialization in production with a constantly decreasing vertical range of manufacture in industry has led to a doubling of freight transport on the road.
- Increase of motorization: On the one hand, the continuously increasing number of cars and lorries is a logical result of the tendencies mentioned above and, therefore, only “a means to an end“ (Figure 6). On the other hand, the intensive use of the car with all its advantages for the individual has formed the structure of our settlements and intensified our dependency on the car, and has consequently created additional motorized traffic.

In the coming decade no change in these tendencies can be foreseen. Therefore, traffic jams will be increasing as well as the negative impact on people, business and environment. Our forecasts for transport demand on the federal autobahn and highway system in Germany start from a further increase in passenger mileage of 20 percent and of the ton mileage of 75 percent by the year 2010. The prospect for the urban transport demand is not much better, above all when considering that there is no more space for additional streets in our European cities, which have grown in the course of many centuries.

In view of this development, the urgent question arises as to a way out of that dilemma. Even if we should be able to solve the numerous problems, such as air pollution, by better vehicle performance, at least one problem will remain: we will have too many cars on a limited space. The panacea applied during long decades, namely to provide more space by building more and bigger roads will have to be ruled out more and more due to financial, ecological and social reasons, and – as mentioned above - in many areas, like in the cities, simply due to the fact that there is no additional space available. The old cure-all to extend traffic infrastructure where congestion arises, means to cure the symptom and not the cause.

Transport scientists and planners in Germany and other industrialized countries in the world try to find long-term solutions to these problems, taking into consideration all demands and interests of people, environment as well as business. The transport sciences in Germany have pursued this objective not only since the conference of Rio in 1992. But since that conference, the problem has become much more serious due to the fact that the industrial nations have become or should become aware of the fact that they are consuming more than they would be allowed, if all people in all countries, industrial and developing countries alike, were to be treated in the same way.

Policies for urban and regional transport planning

These prospects for the European agglomeration areas and big cities mean that we have to pay more attention to maintaining the accessibility of the cities than to increasing the mobility of people – or the mobility of people using private cars. This does not mean a policy against the car. It means a policy with the car as one of several available means of transportation, which all have their specific advantages and which should be connected. We need motor traffic in our cities, but we have to take care that motor traffic does not clog our cities and makes them inaccessible even for other modes, such as public transport.

For that purpose we need policies which are suitable to maintain or increase the accessibility of our living areas without decreasing their quality of life. And for our congested cities and for the emerging motor traffic arising in the future this means that we should apply the following main strategies:

- avoiding motor traffic, for instance, by car pooling or choosing the nearer destination,
- shifting motor traffic to other transport modes, e.g. to public transport or the bicycle,
- guidance of motor traffic, e.g. on the shortest or acceptable routes.

Of course, the extension of transport infrastructure and even of the street network is necessary in future also, but only where traffic management is not effective in itself.

There are a lot of policies which seem to be suitable for supporting the strategies mentioned above and which can be subdivided into the following groups:

- measures of infrastructure
- operational measures
- information-based measures
- management measures for private car traffic
- operational measures for freight transport.

Policy 1: Traffic-reducing regional and land use planning

As mentioned in the beginning, one of the main reason for the enormous increase in the motorized private transport demand during the last decades in German cities was due to people moving to the environs. It is estimated, for instance, that the City of Braunschweig with about 250,000 inhabitants in the year 1973, will lose between 17,000 and 30,000 people by the year 2010. Our calculations are that a loss of only 17,000 people will produce an increase in car mileage of about 250,000 car kilometres per weekday.

The most important and effective strategy from the point of view of sustainable transport planning should be to stop this migration. To stop, in particular, young families who are willing to build new homes in a natural area from leaving the cities, it is necessary to offer them land within the urban area, or attractive dwellings, for instance within reconstructed and traffic-calmed old city areas. If this migration tendency could be stopped, approximately 80 percent of the future motor traffic in our cities could be avoided.

A general policy of town and land use planning in our cities has to be a mixture of land use types, and no longer a policy of separating residential areas far away from business and production areas, as it has been done since the Charta of Athens almost 70 years ago. The aim should be the “town of short trips“. This policy can avoid a lot of car trips within the cities and can reduce negative impacts on the population.

Policy 2: Improving the situation for public transport

Forty to fifty percent of the motor traffic in the big cities of Germany is generated by people living in the environs. In the future this percentage will be increasing due to the ongoing tendency of families to leave the city. The estimation for the City of Braunschweig suggests a significant increase of 10 percent in motor traffic and of 4 percent of public transport within the city generated by the population of the environs.

The potential for public transport demand of people living in the environs are much higher than might be assumed. Firstly, there are about 40 percent of the people who have no car available and whose radius of action is essentially limited to their living areas. These people create a transport demand for shopping and leisure activities in the city which can be satisfied only by public transport. Secondly, an attractive public transport system can compete with the private car, if public transport can be accelerated by bus lines, separate tramway lines, systems for switching traffic signals, and so on.

Policy 3: Improving the situation for non-motorized traffic (bicycle and pedestrian traffic)

In the 60s and 70s, pedestrians and bicyclists were neglected in transport planning. This fact reflected the low importance of these modes in the public awareness. Obviously, the fact that these sustainable transport modes were underrated can be explained by the natural limits with regard to speed and radius. In the last two decades, bicycle traffic has received a fresh impetus not only for leisure activities, but also as a transport mode for weekday traffic. The bicycle is a very suitable and fast transport mode in the dense traffic of our cities.

The empirical results of all our household surveys on travel behaviour show a very uniform share of 20 percent of all car trips with a trip length less than 2 kilometres, and of 50 percent with a trip length less than 5 kilometres. These relatively short trip lengths suggest a relatively high potential for a shift from car trips to pedestrian and bicycle trips. The mode split of the trips generated by the people of Braunschweig show 14 percent bicycle and 24 percent pedestrian trips. A shift of 20 percent of all car trips shorter than 5 kilometres means a shift of 10 percent of all trips changing from car to bicycle or pedestrian trips, and that would give a resultant mode split of 28 percent pedestrian trips and 20 percent bicycle trips. A decrease of car trips from today 48 percent to 38 percent in future could clear enough space on the road to compensate the forecasted increase of car trips for the next decade.

An example of how bicycle traffic demand can successfully be encouraged is the city of Troisdorf near Cologne. Here, the improvement of the bicycle infrastructure combined with an intensive influence on public awareness produced an increase from 16 to 21 percent bicycle trips, while the share of pedestrian and public transport trips remained unchanged. There is another city in Germany with a traditionally high level of non-motorized trip percentage, namely the city of Muenster. This city, which is comparable to Braunschweig with regard to size and topography, shows with 32 percent bicycle trips and 18 percent pedestrian trips what attractive planning and a corresponding public atmosphere can achieve.

Just due to the fact that pedestrians and bicyclists are the weakest, but on the other hand the ecologically most beneficial road users, sustainable transport planning should offer a very high standard with regard to safety, accessibility and comfort of these transport modes. In this way, the attractiveness of these modes can be increased and a maximum shift from car usage to non-motorized traffic can be achieved.

Policy 4: Parking space management

The severest problems in German agglomerations and particularly in inner-city areas arise from the fact that there is not enough parking space. The typical situation is that the employees occupy the parking lots during the whole day, and so the later arriving delivery traffic and customer traffic does not find enough parking spaces.

The most important aim for inner-city areas is their accessibility, not only for pedestrians and bicyclists and public transport, but also for the “necessary“ motor traffic. Necessary motor traffic is resident traffic, business and delivery traffic and customer traffic. The trips of employees to work and trips for educational purposes can be shifted to other modes, in particular to public transport. An effective policy for achieving this aim is the management of parking space.

The usual parking space management concept provides a change of long-term to short-term parking lots with a maximum parking time of 3 hours. From experience we know that a long-term parking space is used by 1 to 2 cars per day, a short-term parking space, however, by 5 to 7 cars per day. Therefore, a short-term parking space is used much more intensively, so that the requests of retailers in the city for parking facilities for their customers can be satisfied.

Policy 5: Socially and ecologically acceptable management of motor traffic

The main transport planning principle in the 60s and 70s was the endeavour to extend the infrastructure and particularly the roads to comply with the forecasted increase of transport demand. This “adaptation planning“ has reached its limits during the last two decades. In cities and particularly in inner-city areas these limits of the car-oriented extension of streets and of the ability of the people to cope with noise and air pollution have now been exceeded.

If the capacity of the streets cannot be extended, the idea of using the existing space more effectively seems to suggest itself. The new magic word for solving the traffic problems is telematics. A lot of new technologies are emerging, which are to provide for collective guidance of traffic flows in order to bypass or avoid traffic jams, but also navigation systems for finding the shortest route to a given destination and for finding a place to park. These techniques can be very useful and can help reduce car mileage. On the other hand, this may create new problems, if traffic is guided on hidden paths through quiet residential areas in order to bypass congested streets.

A scourge of many people in the city is noise and air pollution. A household survey performed in the whole city area showed that noise and air pollution are the most important irritations of the population. For this reason, the municipalities of many cities in Germany are planning to concentrate motor traffic on a network of main traffic arteries, while residential areas are changed to traffic restrained zones with a speed limit of 30 kilometres. This measure can help reduce the noise level by 2 to 4 dB(A).

Policy 6: Connection of the different transport systems

An important aim of transport planning must be to support the specific advantages of every transport mode and make the change from one mode to the other easier for the user. So, park-and-ride is one of the most often applied methods for shifting trips partially from car to public transport. Some German cities made the mistake to offer park-and-ride lots within the municipality area and too near to the city, so that they need very big parking lots, which were used by many people not actually using the park-and-ride system. Moreover, public transport in the outer areas or in the environs is not supported by this, but, on the contrary, the dependence on car usage in these areas is fixed. So it is necessary to offer park-and-ride facilities on more decentralized locations in the surroundings and to make car users change earlier to public transport.

An underrated chance in German agglomerations to make people use public transport is to provide facilities where bicycles can safely be parked near the railway station. The bicycle boom in the last decade connected with a rising health consciousness had the effect that more people use more expensive high-quality bikes and mountain bikes, which they want to be kept safely and protected from the rain.

Policy 7: Integrated transport management

The infrastructural connection of the different transport systems is a precondition for a multimodal travel demand. But optimal use of the different travel possibilities offered in this connected system is possible only, if an optimum of information is available by suitable, easy to understand and easy to handle telematic systems. The aim must be a PTA (personal travel assistant), which is like a mobile and offers at least all traffic information – every time and at every location. In Europe several institutions are going to develop such PTAs. My institute is involved in a research project sponsored by the Federal Department of Research and Technology, developing a location-based service for the area of Berlin where not only transport information can be called up, but also other data about local offers.

Policy 8: Operational measures for freight transport

Roads can be relieved from the permanently increasing lorry traffic only, if the loading processes between lorry and train and railway transport are accelerated. The German railway company is planning a network of freight transport centres. Freight transport centres are facilities connecting the different systems road and rail and water way, but also long and short-distance traffic. They are cooperation centres as well as logistic nodes. The idea is that goods are brought by lorries to the regional freight transport centre, loaded onto the train, transported over night to the freight transport centre of the destination region, loaded on a lorry and taken to the final destination. By

this strategy, the goods are moved by rail for most of the distance, and so long-distance freight transport can be shifted to the railway. The aims of freight transport centres are

- to perform the process of freight transport more effectively,
- reduce the damaging impacts of freight transport on traffic and environment,
- to support the regional business structure.

Today, there are more than 15 freight transport centres already in operation in Germany. Environmental reasons often make it difficult for these centres to be realized. In our region of Braunschweig and Wolfsburg and Salzgitter, we have two freight transport centres, one at the Volkswagen factory in Wolfsburg, and one at the Volkswagen factory Salzgitter. The latter was initiated by a location study and found an almost ideal location: there we have already a railway, autobahn, canal connection and no environmental problems.

Freight transport centres provide functions of both goods collection and goods distribution centres and can be important elements of a city logistic concept. The aim of a city logistic concept is a reduction of the great number of uncoordinated lorry trips with ineffective utilization within the city, which can be substituted by a smaller number of delivery trips with smaller cars and higher utilization. In this way, the economy of transport is increased and, on the other hand, the city is partially relieved from lorry traffic. A six-month test of a city logistic concept in the city of Kassel showed a reduction of lorry mileage by 60 percent and an increase of the utilization by 100 percent.

Policy 9: Public relations work

Intensified public relations work is absolutely necessary for the realization of measures and strategies of socially and ecologically accepted transport planning. The reason for that is, firstly, that measures always create positive and negative impacts when implemented and, secondly, that travel behaviour and transport demand is created in the heads of the people.
Therefore, the measures have to be accepted by the people if an optimum of benefit is to be created. In particular in case that unpopular measures have to be taken, people will accept them only if the benefit is explained.

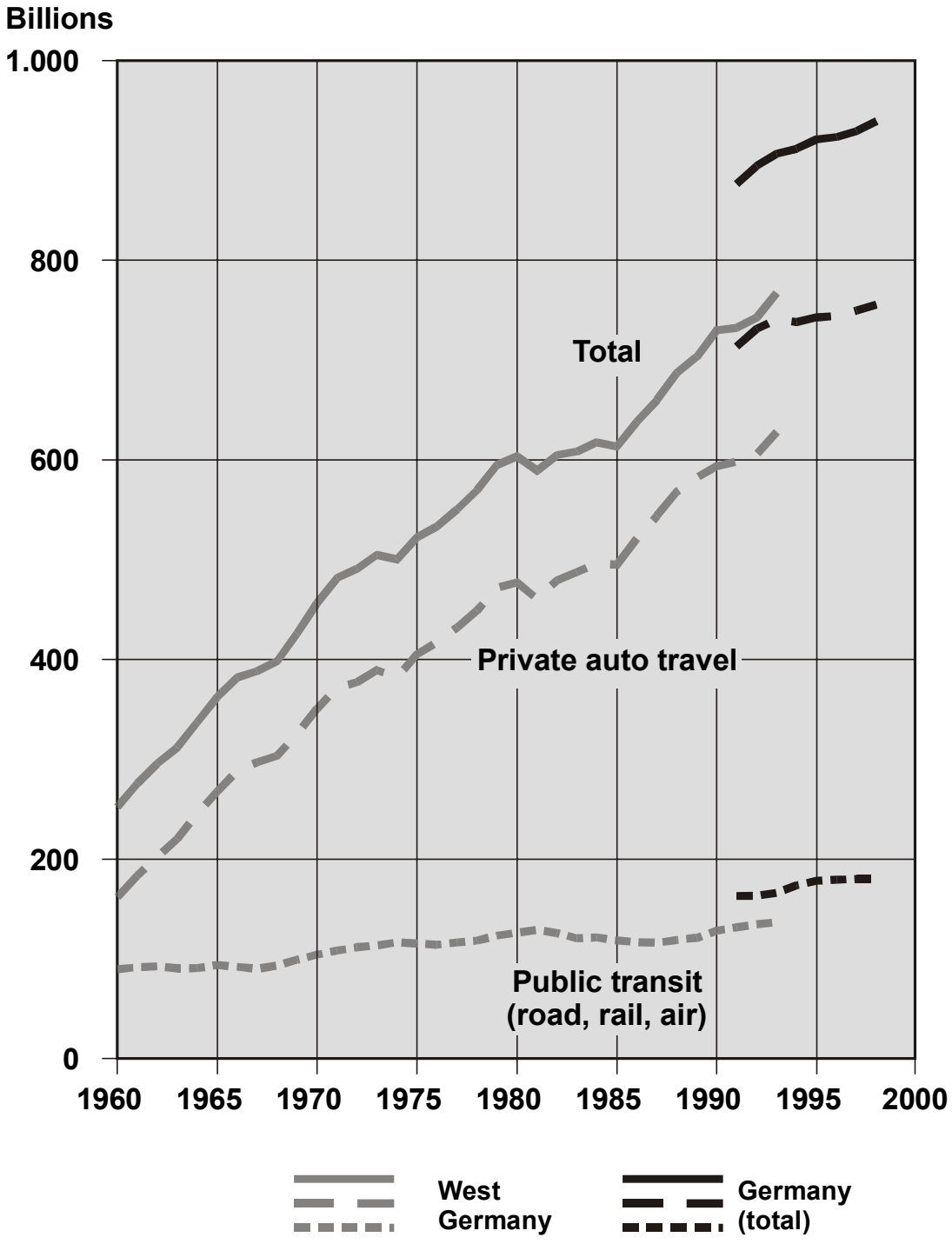
Transport policies usually have the aim of influencing travel behaviour and transport demand with a view to improving the whole system. People usually take care of their own benefit and do not see – like the planner - the welfare of the whole population. They are not able to see clearly the complex connections between individual behaviour and the impacts of this behaviour as a mass phenomenon on population, environment and economy. This has to be explained to obtain acceptance of measures.

Conclusion

Another possibility for explaining the enormous increase of transport demand and in particular of motor traffic is the fact that transport costs are lower than alternative costs (e. g. for labour) or are underrated by people compared with the amenities of life. The aim of sustainable development in transport cannot be achieved free of charge. Due to my assumption that people will not be prepared to give up some cherished amenities voluntarily, I think that whatever the solution may be, it will cost more money for transport. The only remaining questions are, who will have to pay this money and whether we will be successful in allocating these costs in a socially acceptable manner.

Passenger Transport

Passenger km per year

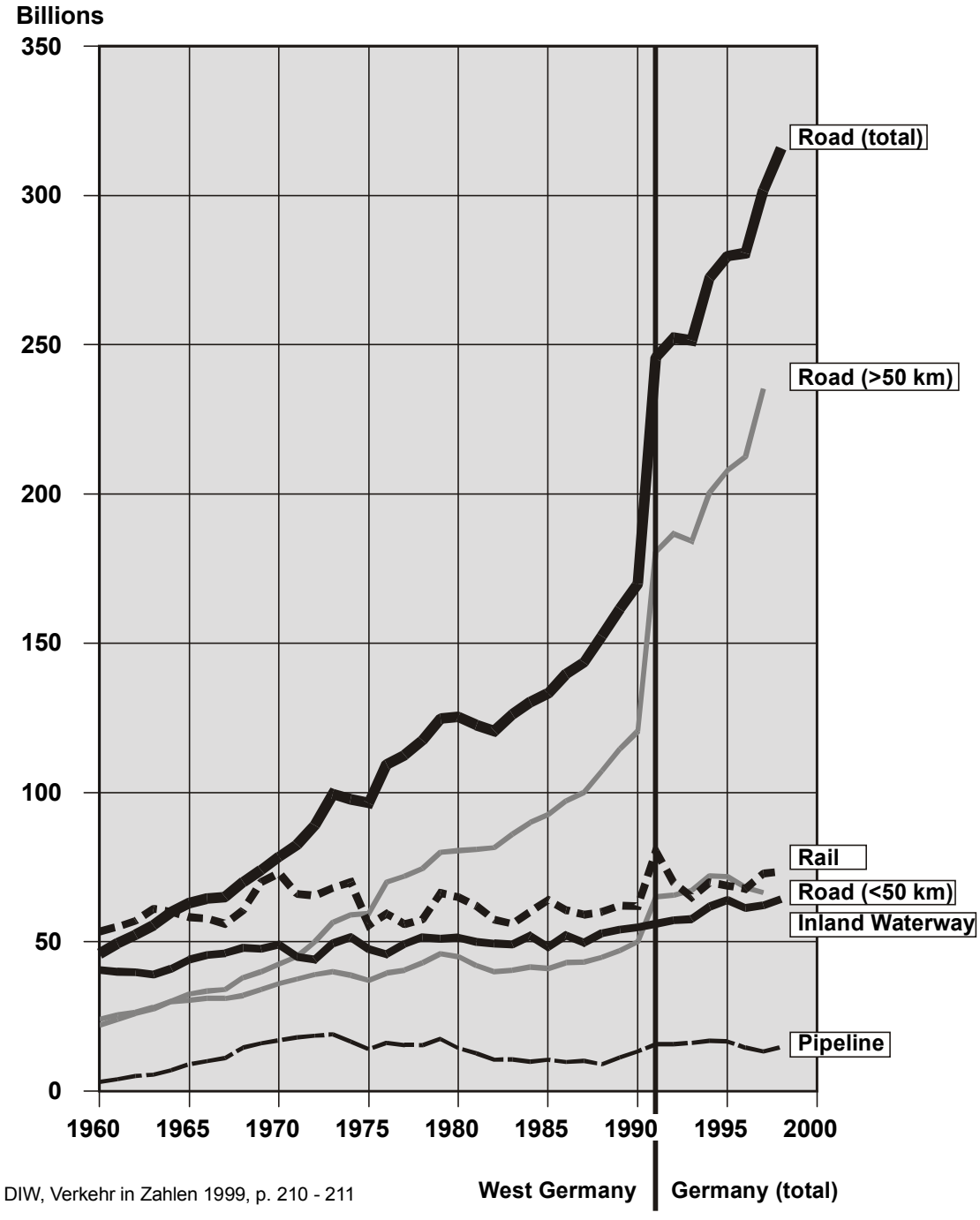


DIW, Verkehr in Zahlen 1999, p. 210 - 211

Fig. 1

IVS_970012

Freight transport (Germany)
tons-km per year



DIW, Verkehr in Zahlen 1999, p. 210 - 211

Fig. 2

IVS_970008

Commuting traffic between communities by mainly used mode
West Germany Population census

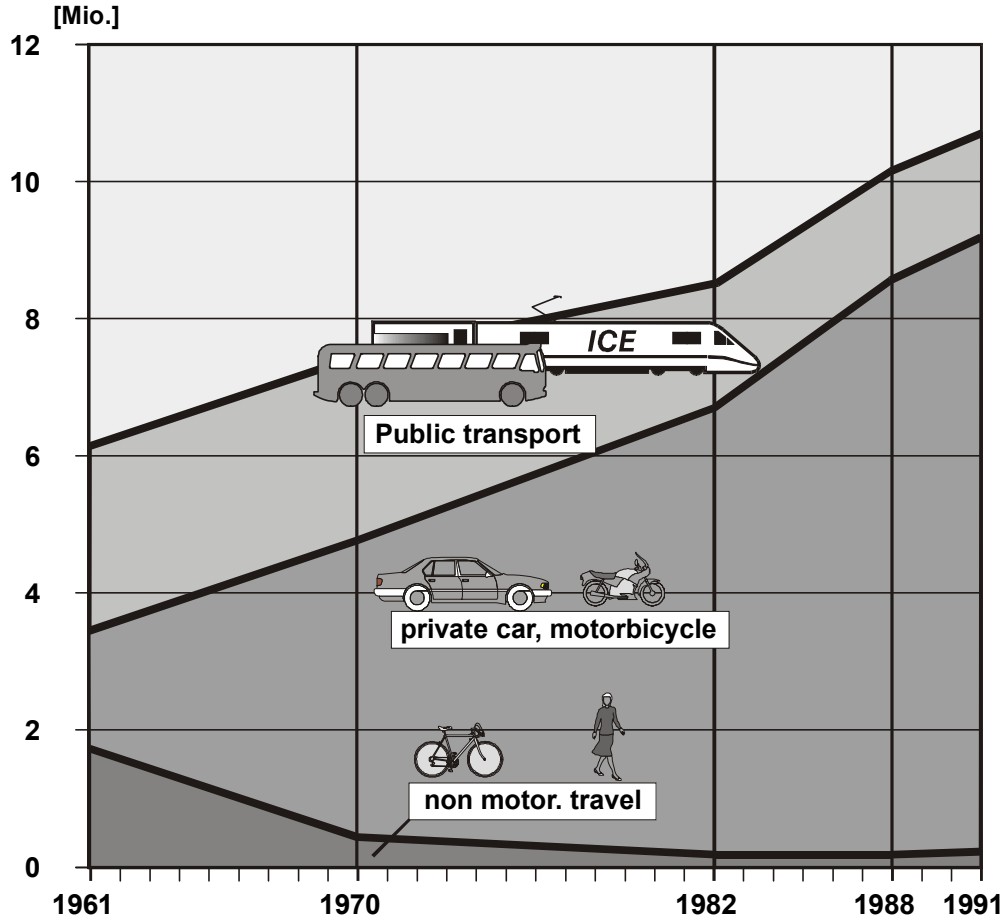


Fig. 3

IVS_950002_2

Increase of weekday private motor transport between 1970 and 1990

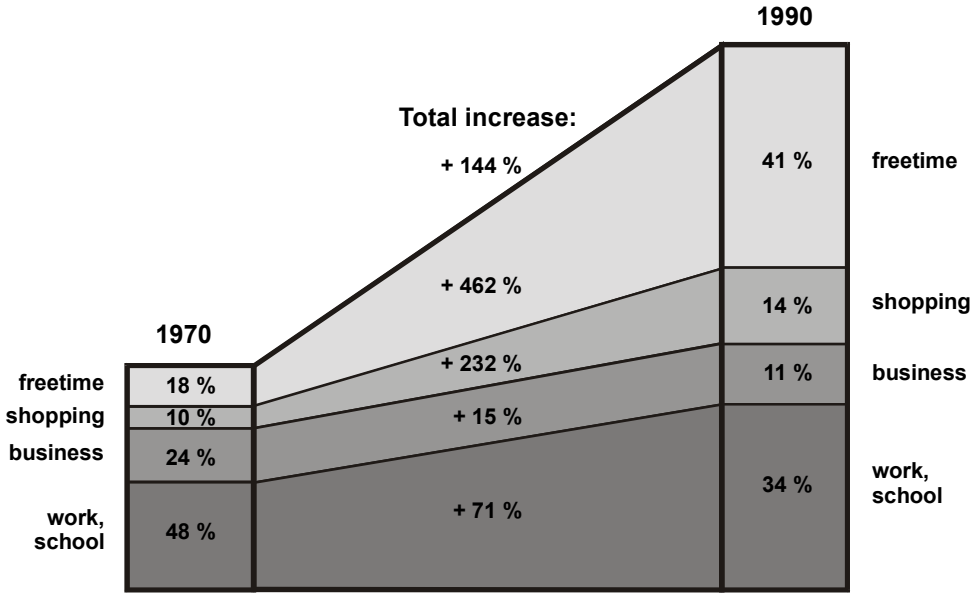


Fig. 4

Development of weekday course of private car traffic

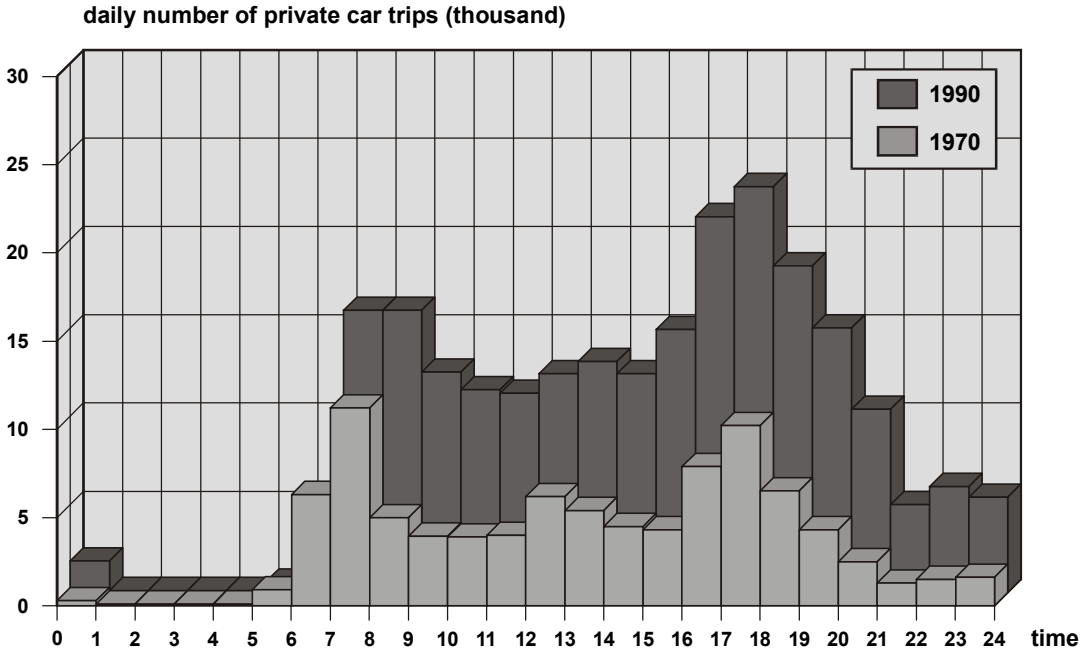
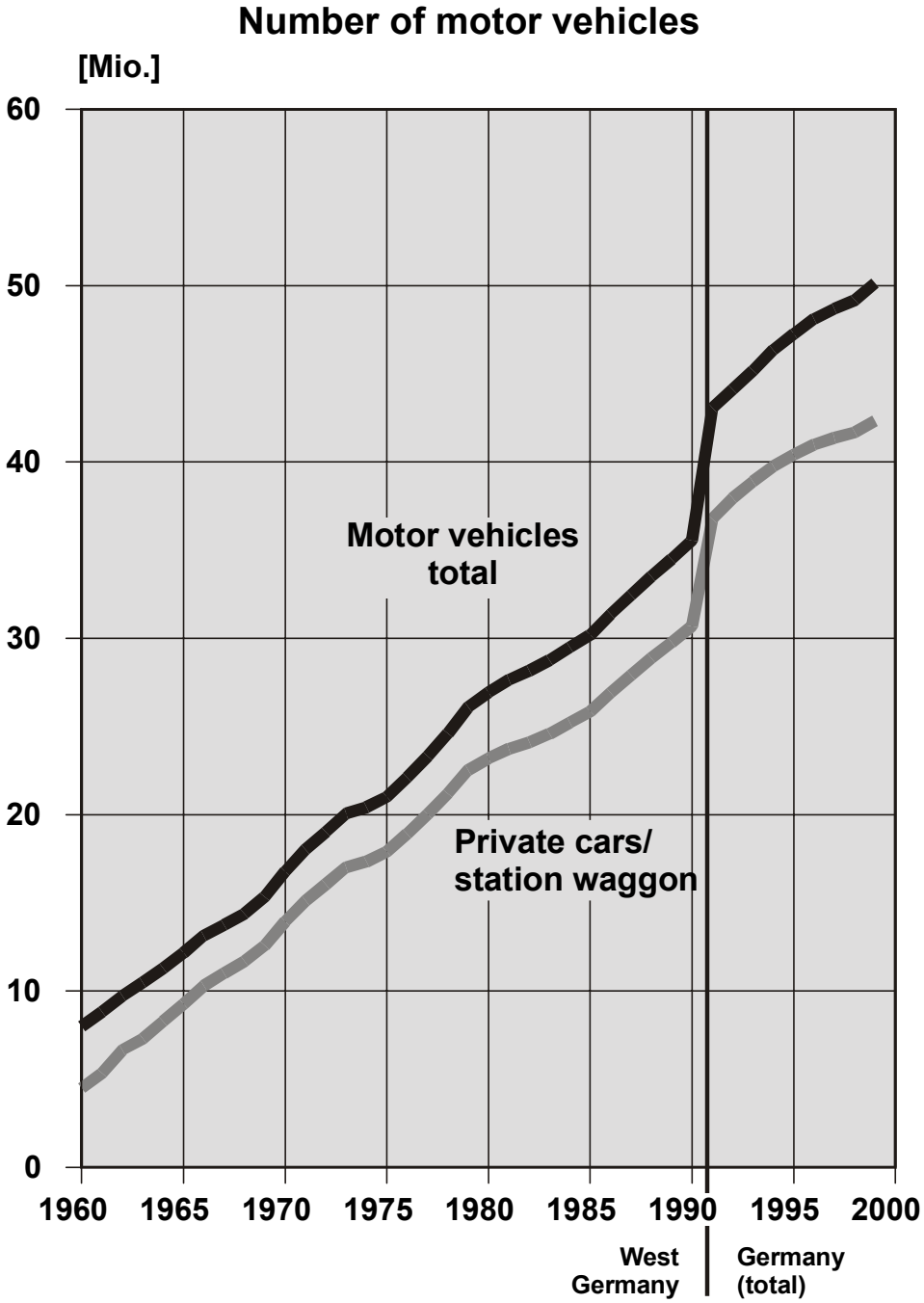


Fig. 5



DIW, Verkehr in Zahlen 1999, p. 136 - 137

Fig. 6

IVS_00_089

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Curriculum Vitae

Prof. Dr. Manfred J. Wermuth

- Head of the Institute of Transport and Urban Planning , University of Technology Braunschweig, Germany and
- Director of the Consulting Comp. WVI Prof. Dr. Wermuth – Transportation Research and Infrastructural Planning GmbH, Braunschweig.

1941 Feb 1st born in München

since 1974 married with Rosemary Wermuth

1976 birth of son Tobias
1978 birth of son Sebastian

1960 – 1966 Study of Mathematics, Statistics and Operations Research, University of Technology München

1967 – 1981 Teaching and Research Assistant, Inst. of Transport and Urban Planning, Civil Engineering Department, Univ. of Techn. München

1981 – 1989 Professor of Urban and Regional Planning, Univ. of Techn. Braunschweig

since 1989 Professor of Urban Engineering and Urban Transport and Head of the Institute of Transport and Urban Planning

1993 - 1995 Head of the Department of Civil Engineering

1995 - 1997 Senator of the University of Technology Braunschweig

Awards:
1975 August-Loesch-Award of the German Association of Regional Science
1980 Feuchtinger – Wehner – Award of the Research Society of Road- and Transport Engineering given for contributes in road traffic research and planning

Honorary activities:
Since 1985 Chairman of the Research Group “Traffic Surveys and Travel Demand Forecasting“ of the Research Society of Road and Transport Engineering
Since 1998 Chairman of the Feuchtinger – Wehner – Foundation

Professional activities:
Researcher and consultant of the Federal Department of Transportation, the Department of Research and Technology in Germany, the Ministry of Economics of Austria, of many planning authorities of states and communities in Germany and Austria.

Planning activities:
German autobahn and highway network, Regional transport plans for München, Mannheim, Rhein-Neckar, Hamburg, Heidelberg, Braunschweig, Wolfsburg